IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application : **10/621,003**

Applicant(s) : **BRULS et al.**

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Examiner : **ANYIKIRE, Chikaodili E.**

Atty. Docket : **NL-030905**

Title: **VIDEO DECODER LOCALLY USES MOTION-COMPENSATED INTERPOLATION TO RECONSTRUCT MACRO-BLOCK SKIPPED BY ENCODER**

Mail Stop: **APPEAL BRIEF - PATENTS**
Commissioner for Patents
Alexandria, VA 22313-1450

APPEAL UNDER 37 CFR 41.37

Sir:

This is an appeal from the decision of the Examiner dated 1 October 2007, finally rejecting claims 1-21 of the subject application.

This paper includes (each beginning on a separate sheet):

1. **Appeal Brief;**
2. **Claims Appendix;**
3. **Evidence Appendix; and**
4. **Related Proceedings Appendix.**

APPEAL BRIEF

I. REAL PARTY IN INTEREST

The above-identified application is assigned, in its entirety, to **Koninklijke Philips Electronics N. V.**

II. RELATED APPEALS AND INTERFERENCES

Appellant is not aware of any co-pending appeal or interference that will directly affect, or be directly affected by, or have any bearing on, the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-21 are pending in the application.

Claims 1-21 stand rejected by the Examiner under 35 U.S.C. 102(e).

These rejected claims are the subject of this appeal.

IV. STATUS OF AMENDMENTS

No amendments were filed subsequent to the final rejection in the Office Action dated 1 October 2007.

V. SUMMARY OF CLAIMED SUBJECT MATTER

This invention addresses the processing of video data for efficient transmission (Applicants' page 1, lines 7-8). In an example embodiment (FIG. 5), if (506) a segment of a video picture can be reconstructed from another video picture based on motion-compensated interpolation, it is not encoded (508); otherwise, it is encoded (510) (page 10, lines 25-31). In an example embodiment, the segments that are assessed to determine whether they can be reconstructed are macroblocks of "B" frames in an MPEG-2 encoding (page 3, lines 10-16). At the decoder (FIG. 6), if (604) a segment is discovered to be missing, the missing segment is reconstructed using motion-compensated interpolation from other video pictures (606) (page 10, lines 32-34).

As claimed in independent claim 1, an embodiment of the invention comprises a method of encoding a video picture, the method comprising (FIG. 5):

for a segment of the video picture, determining if the segment can be reconstructed from at least another video picture based on motion-compensated interpolation applied to the other video picture (504-506) (page 10, lines 25-29);

if (506) the segment cannot be reconstructed, encoding the segment (510); and otherwise skipping the segment (508) (page 10, lines 29-31).

As claimed in dependent claim 4, an embodiment of the invention comprises the method of claim 3, wherein the coding scheme complies with MPEG-2 and wherein the determining comprises (FIGs. 2 and 3):

decoding an encoded B-picture (206);

generating a further picture using motion-compensated interpolation applied to the other video picture (220) (page 9, lines 24-27);

determining a difference per macroblock between the decoded B-picture and the further picture (222, 302) (page 9, lines 27-28); and

evaluating the difference under control of a consistency measure of motion vectors associated with the further picture (304) (page 9, lines 28-29).

As claimed in dependent claim 20, an embodiment of the invention comprises the method of claim 3, wherein the coding scheme complies with MPEG-2 and wherein the determining comprises (FIGs. 2 and 3):

generating a further picture using motion-compensated interpolation applied to the other video picture (220) (page 9, lines 24-27);

determining a difference per macroblock between the further picture and the video picture (222, 302) (page 9, lines 27-28); and

evaluating the difference under control of a consistency measure of motion vectors associated with the further picture (304) (page 9, lines 28-29).

As claimed in independent claim 5, an embodiment of the invention comprises an electronic device (FIG. 2) comprising an encoder (218) for encoding a video picture, wherein the encoder (218) is configured to determine (222) for a segment of the picture if the segment can be reconstructed from at least another video picture based on motion-compensated interpolation applied to the other video picture (page 9, lines 24-29); and wherein the encoder (218) encodes the segment if the segment cannot be reconstructed, and skips the segment otherwise (224, 226) (page 9, lines 29-34).

As claimed in dependent claim 8, an embodiment of the invention comprises the device of claim 7, wherein the coding scheme complies with MPEG-2 and wherein the encoder comprises (FIGs. 2 and 3):

a decoder (206) for decoding an encoded B-picture;

a generator (220) for generating a further picture using motion-compensated interpolation applied to the other video picture (page 9, lines 24-27);

a comparator (222, 302) for determining a difference per macroblock between the decoded B-picture and the further picture (page 9, lines 29-31); and

an evaluator (304) for evaluating the difference under control of a consistency measure of motion vectors associated with the further picture (page 9, lines 28-29; page 7, lines 14-18).

As claimed in dependent claim 21, an embodiment of the invention comprises the device of claim 7, wherein the coding scheme complies with MPEG-2 and wherein the encoder comprises (FIGs. 2 and 3):

a generator (220) for generating a further picture using motion-compensated interpolation applied to the other video picture (page 9, lines 24-27);

a comparator (222, 302) for determining a difference per macroblock between the further picture and the video picture (page 9, lines 27-28); and

an evaluator (304) for evaluating the difference under control of a consistency measure of motion vectors associated with the further picture (page 9, lines 28-29; page 7, lines 14-18).

As claimed in independent claim 9, an embodiment of the invention comprises a method of decoding an encoded video picture comprising (FIG. 6):

determining if a segment of the picture is missing (604); and

if the segment is missing, reconstructing the segment from motion-compensated interpolation applied to at least another video picture (606) (page 10, lines 32-34).

As claimed in dependent claim 12, an embodiment of the invention comprises a method of claim 10, wherein:

decoding the picture comprises using an MPEG-2 skipped-macroblock condition (page 10, lines 17-18); and

writing data, generated by the motion-compensated interpolation to reconstruct the macroblock, over further data generated under the skipped-macroblock condition (page 10, lines 18-24).

As claimed in independent claim 13, an embodiment of the invention comprises an electronic device (FIG. 4) comprising a decoder (400) for decoding an encoded video picture, the decoder being operative to reconstruct a missing segment of the video picture (404) (page 10, lines 17-19) based on motion-compensated interpolation (406) applied to at least another video picture (402) (page 10, lines 19-24).

As claimed in dependent claim 14, an embodiment of the invention comprises the device of claim 14, configured to decode the picture using a skipped-macroblock condition (page 10, lines 17-18); and operative to write data, generated by the motion-compensated interpolation to reconstruct the macroblock (page 10, lines 18-22), over further data generated under the skipped-macroblock condition (page 10, lines 23-24).

As claimed in independent claim 17, an embodiment of the invention comprises a computer readable medium that includes control software for installing on an electronic device for decoding a video picture from which a segment is missing (page 4, lines 32-33), the software being configured to reconstruct the segment based on motion compensated interpolation applied to at least another video picture (page 4, line 33 - page 5, line 2).

As claimed in independent claim 18, an embodiment of the invention comprises a computer readable medium that includes control software for installing on an electronic device for encoding a video picture (page 5, lines 3-4), the software being configured to determine for a segment of the picture if the segment can be reconstructed from at least another video picture based on motion-compensated interpolation applied to the other video picture (page 5, lines 4-6); and to control the encoding so as to have the segment encoded if the segment cannot be reconstructed, and to have the segment skipped otherwise (page 5, lines 6-8).

As claimed in independent claim 19, an embodiment of the invention comprises a computer readable medium that includes electronic video content information (page 5, line 9) encoded such that at decoding at least one segment of at least one picture is to be reconstructed using motion-compensated interpolation performed on at least one other picture (page 5, lines 10-12).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-21 stand rejected under 35 U.S.C. 102(e) over Kato et al. (USP 6,535,556, hereinafter Kato).

VII. ARGUMENT

Claims 1-21 stand rejected under 35 U.S.C. 102(e) over Kato

MPEP 2131 states:

> "A claim is anticipated only if ***each and every element*** as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The ***identical invention*** must be shown in as ***complete detail*** as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claims 1-8 and 18-21

As claimed in claim 1, upon which claims 2-4 and 20 depend, an embodiment of the invention comprises a method that includes determining if a segment of a video picture can be reconstructed from at least another video picture based on motion-compensated interpolation applied to the other video picture; and, if the segment cannot be reconstructed, encoding the segment, otherwise skipping the segment. Independent claim 5, upon which claims 6-8 and 21 depend, and independent claims 18 and 19 include similar limitations, and the Office action provides a common basis for rejecting claims 1, 5, 18, and 19.

Kato fails to teach determining if a segment of a video picture can be reconstructed based on motion-compensated interpolation, and Kato fails to teach skipping the segment if it can be reconstructed.

The Office action cites Kato's FIG. 10 and accompanying text to support this rejection. As clearly illustrated in Kato's FIG. 10, Kato determines (SP21) a measure of difficulty, x, associated with encoding "N number of pictures following the predictive picture to be coded" (Kato, column 17, lines 40-43), and if the measure is above a given threshold (SP32), sets a flag (SP33) to skip the encoding of the predictive picture (Kato, column 17, lines 44-48). In the cited text, Kato determines a

degree of difficulty associated with encoding a picture and does not address determining whether a picture can be reconstructed based on motion-compensated interpolation.

The Office action fails to identify where Kato teaches determining if a segment of a video picture can be reconstructed based on motion-compensated interpolation, and fails to identify where Kato teaches skipping the segment if it can be reconstructed. Instead, the Office action asserts: "If the picture is too difficult [to encode] then the prior art discloses that the block is skipped, which means that the segment cannot be reconstructed." (Office action, page 2, last sentence of paragraph 3.) Even assuming in argument that this convoluted assertion has a rational basis, it fails to show that Kato teaches determining if a segment of a video picture can be reconstructed based on motion-compensated interpolation, and fails to identify where Kato teaches skipping the segment if it can be reconstructed.

The Office action equates Kato's determination of a measure of difficulty to the claimed determination of whether a segment can be reconstructed; if the difficulty is high, the segment is skipped, and cannot be reconstructed. This is contrary to the applicants' claimed invention. As claimed by the applicants, the segment is skipped if it ***can*** be reconstructed; in the Office action's argument, if the segment is skipped, it ***cannot*** be reconstructed.

Because Kato fails to teach determining if a segment of a video picture can be reconstructed based on motion-compensated interpolation, and fails to teach skipping the segment if it can be reconstructed, and because the Office action's assertions in support of the rejection are contrary to the claimed invention, the applicants respectfully maintain that the rejection of claims 1-8 and 18-21 under 35 U.S.C. 102(e) over Kato is unfounded, per MPEP 2131, and should be reversed by the Board.

Claims 4, 8, 20, 21

As claimed in dependent claim 4, an embodiment of the invention includes determining if a segment can be reconstructed includes generating a further picture using motion-compensated interpolation applied to the other video picture and determining a difference per macroblock between a decoded B-picture and the further picture. Dependent claims 8, 20, and 21 include similar limitations, and the Office action provides a common basis for rejecting claims 4, 8, 20, and 21.

The Office action asserts that Kato's block 52 generates a further picture, and that Kato's block 30 determines a difference between segments of a decoded B-picture and this further picture. The applicants disagree with this assertion. As clearly illustrated in Kato's FIG. 9, Kato's block 30 provides an input to Kato's block 52; it does not receive a picture from Kato's block 52 (see also Kato, column 14, lines 44-50). Kato's block 30 determines a degree of difficulty associated with coding the current image, but does not receive an output from Kato's block 52, and thus cannot be said to determine a difference between segments of a decoded B-picture and a further picture that is output from Kato's block 52.

Because the Office action's assertion in support of the rejection of claims 4, 8, 20, and 21 is inconsistent with Kato's teachings, the applicants respectfully maintain that the rejection of claims 4, 8, 20, and 21 under 35 U.S.C. 102(e) over Kato is unfounded, per MPEP 2131, and should be reversed by the Board.

Claims 9-17

As claimed in independent claim 9, upon which claims 10-12 depend, an embodiment of the invention comprises a method of decoding an encoded video picture that includes determining if a segment of the picture is missing; and if the segment is missing, reconstructing the segment from motion-compensated interpolation applied to at least another video picture. Independent claim 13, upon which claims 14-16 depend, and independent claim 17 include similar limitations, and the Office action provides a common basis for rejecting claims 9, 13, and 17.

Kato fails to teach reconstructing a missing segment from motion-compensated interpolation applied to at least another video picture.

The Office action asserts that Kato teaches reconstructing a missing segment from motion-compensated interpolation applied to at least another video picture at block 52 of FIG. 9, and column 15, lines 6-40. The applicants disagree with this assertion. Kato's FIG. 9 is a block diagram of an image encoder, not a decoder, and Kato's column 15, lines 6-40 addresses Kato's coding control unit 31 and associated difficulty-determining elements. The cited text does not address reconstructing a skipped or missing segment from motion-compensated interpolation applied to at least another video picture. Contrarily, Kato's FIG. 10 clearly indicates that skipped pictures are merely replaced by the preceding frame, at SP25.

Because Kato fails to teach reconstructing a missing segment from motion-compensated interpolation applied to at least another video picture, and because the Office action's assertions in support of the rejection address Kato's encoding process, and not a method of decoding, the applicants respectfully maintain that the rejection of claims 9-17 under 35 U.S.C. 102(e) over Kato is unfounded, per MPEP 2131, and should be reversed by the Board.

Claims 12 and 16

As claimed in dependent claim 12, an embodiment of the invention includes using an MPEG-2 skipped-macroblock condition to decode the picture, and writing data generated by the motion-compensated interpolation to reconstruct a macroblock over further data generated under the skipped-macroblock condition. Claim 16 includes similar limitations and the Office action provides a common basis for rejecting claims 12 and 16.

The Office action asserts that Kato teaches using an MPEG-2 skipped-macroblock condition to decode the picture at column 1, lines 18-21, column 2, lines 23-28, and column 15, lines 6-40. The applicants disagree with this assertion, and note that the cited text does not address the MPEG-2 skipped macroblock condition.

The Office action also asserts that Kato teaches writing data generated by the motion-compensated interpolation to reconstruct a macroblock over further data generated under the skipped-macroblock condition at column 14, lines 29-55. The applicants disagree with this assertion, and note that at the cited text, Kato addresses the encoding of blocks of an image, and does not address reconstructing macroblocks under the skipped-macroblock condition.

Because the Office action fails to identify where Kato teaches each of the elements of claims 12 and 16, the applicants respectfully maintain that the rejection of claims 12 and 16 under 35 U.S.C. 102(e) over Kato is unfounded, per MPEP 2131, and should be reversed by the Board.

CONCLUSIONS

Because Kato fails to teach determining if a segment of a video picture can be reconstructed based on motion-compensated interpolation, and Kato fails to teach skipping the segment if it can be reconstructed, the applicants respectfully request that the Examiner's rejection of claims 1-8 and 18-21 under 35 U.S.C. 102(e) over Kato be reversed by the Board, and the claims be allowed to pass to issue.

Because Kato fails to teach reconstructing a missing segment from motion-compensated interpolation applied to at least another video picture, the applicants respectfully request that the Examiner's rejection of claims 9-17 under 35 U.S.C. 102(e) over Kato be reversed by the Board, and the claims be allowed to pass to issue.

Because the Office action's assertions in support of the rejection of claims 4, 8, 12, 16, 20, and 21 are inconsistent with Kato's teachings, the applicants respectfully request that the Examiner's rejection of claims 4, 8, 12, 16, 20, and 21 under 35 U.S.C. 102(e) over Kato be reversed by the Board, and the claims be allowed to pass to issue.

Respectfully submitted

/Robert M. McDermott/
Robert M. McDermott, Esq.
Registration Number 41,508
804-493-0707

Please direct all correspondence to:
Larry Liberchuk, Esq.
Philips Intellectual Property and Standards
P.O. Box 3001
Briarcliff Manor, NY 10510-8001
914-333-9618

CLAIMS APPENDIX

1. A method of encoding a video picture, the method comprising:

- for a segment of the video picture determining if the segment can be reconstructed from at least another video picture based on motion-compensated interpolation applied to the other video picture;
- if the segment cannot be reconstructed, encoding the segment; and
- otherwise skipping the segment.

2. The method of claim 1, wherein the segment comprises a macroblock.

3. The method of claim 1, wherein the encoding comprises using a coding scheme compliant with one of ISO and ITU video compression standards.

4. The method of claim 3, wherein the coding scheme complies with MPEG-2 and wherein the determining comprises:

- decoding an encoded B-picture;
- generating a further picture using motion-compensated interpolation applied to the other video picture;
- determining a difference per macroblock between the decoded B-picture and the further picture; and
- evaluating the difference under control of a consistency measure of motion vectors associated with the further picture.

5. An electronic device comprising an encoder for encoding a video picture, wherein the encoder is configured to determine for a segment of the picture if the segment can be reconstructed from at least another video picture based on motion-compensated interpolation applied to the other video picture; and wherein the encoder encodes the segment if the segment cannot be reconstructed, and skips the segment otherwise.

6. The device of claim 5, wherein the segment comprises a macroblock.

7. The device of claim 5, wherein the encoder is configured to use a coding scheme compliant with one of ISO and ITU video compression standards.

8. The device of claim 7, wherein the coding scheme complies with MPEG-2 and wherein the encoder comprises:

- a decoder for decoding an encoded B-picture;
- a generator for generating a further picture using motion-compensated interpolation applied to the other video picture;
- a comparator for determining a difference per macroblock between the decoded B-picture and the further picture; and
- an evaluator for evaluating the difference under control of a consistency measure of motion vectors associated with the further picture.

9. A method of decoding an encoded video picture, the method comprising:

- determining if a segment of the picture is missing; and
- if the segment is missing, reconstructing the segment from motion-compensated interpolation applied to at least another video picture.

10. The method of claim 9, wherein the segment comprises a macroblock.

11. The method of claim 9, wherein the video picture is encoded using a coding scheme compliant with one of ISO and ITU video compression standards.

12. The method of claim 10, wherein:

- decoding the picture comprises using an MPEG-2 skipped-macroblock condition; and
- writing data, generated by the motion-compensated interpolation to reconstruct the macroblock, over further data generated under the skipped-macroblock condition.

13. An electronic device comprising a decoder for decoding an encoded video picture, the decoder being operative to reconstruct a missing segment of the video picture based on motion-compensated interpolation applied to at least another video picture.

14. The device of claim 13, wherein the missing segment comprises a macroblock.

15. The device of claim 13, configured to decode the picture encoded using a coding scheme compliant with one of ISO and ITU video compression standards.

16. The device of claim 14, configured to decode the picture using a skipped-macroblock condition; and operative to write data, generated by the motion-compensated interpolation to reconstruct the macroblock, over further data generated under the skipped-macroblock condition.

17. Computer readable medium that includes control software for installing on an electronic device for decoding a video picture from which a segment is missing, the software being configured to reconstruct the segment based on motion compensated interpolation applied to at least another video picture.

18. Computer readable medium that includes control software for installing on an electronic device for encoding a video picture, the software being configured to determine for a segment of the picture if the segment can be reconstructed from at least another video picture based on motion-compensated interpolation applied to the other video picture; and to control the encoding so as to have the segment encoded if the segment cannot be reconstructed, and to have the segment skipped otherwise.

19. Computer readable medium that includes electronic video content information encoded such that at decoding at least one segment of at least one picture is to be reconstructed using motion-compensated interpolation performed on at least one other picture.

20. The method of claim 3, wherein the coding scheme complies with MPEG-2 and wherein the determining comprises:

- generating a further picture using motion-compensated interpolation applied to the other video picture;
- determining a difference per macroblock between the further picture and the video picture; and
- evaluating the difference under control of a consistency measure of motion vectors associated with the further picture.

21. The device of claim 7, wherein the coding scheme complies with MPEG-2 and wherein the encoder comprises:

- a generator for generating a further picture using motion-compensated interpolation applied to the other video picture;
- a comparator for determining a difference per macroblock between the further picture and the video picture; and
- an evaluator for evaluating the difference under control of a consistency measure of motion vectors associated with the further picture.

EVIDENCE APPENDIX

No evidence has been submitted that is relied upon by the appellant in this appeal.

RELATED PROCEEDINGS APPENDIX

Appellant is not aware of any co-pending appeal or interference which will directly affect or be directly affected by or have any bearing on the Board's decision in the pending appeal.